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Claims 1-2 (Original)

1. A method for selectively opening rings in polyhedral oligomeric silsesquioxane (POSS) compounds to form functionalized derivatives comprising, reacting $[(RSiO_{1.5})_n]_{\Sigma\#}$ with an acid to form POSS species bearing one or more functionalities suitable for polymerization, grafting or catalysis, where R is aliphatic, aromatic, olefinic, alkoxy, siloxy or H, n is 4-24, # is n and said acid is HBF_4/BF_3, CF_3SO_3H, $ClSO_3H$, CH_3SO_3H, H_2SO_4, $HClO_4$, HCl, HBr, HI, HF or combinations thereof.

2. The method of claim 1 wherein at least one Si-O-Si bond is shifted in said compound after adding said acid.

Claim 3 (Amended)

3. (Amended) A method for selectively opening the rings in POSS compounds to form functionalized POSS derivatives comprising, reacting $[(RSiO_{1.5})_n]_{\Sigma\#}$ with a strong acid to form $[(RSiO_{1.5})_{n-m}(RXSiO_{1.0})_m]_{\Sigma\#}$, where n is 4-24, m is 1-10, # is m+n, R is selected from the group consisting of aliphatic, aromatic, olefinic, alkoxy, siloxy and H and X is the conjugate base of said acids, which base is F, OH, SH, NHR, NR_2, ClO_4, SO_3CH_3, SO_3CF_3, SO_3OH, SO_3Cl, SO_3CH_3, NO_3, PO_4 or Cl.

Claim 4 (Original)

4. The method of claim 3 wherein organo or organosilicon reagents are added to replace said $(RXSiO_{1.0})_m$ with functionalities selected from the group of silanes, silylhalides, silanols, silylamines, organohalides, alcohols, alkoxides, amines, cyanates, nitriles, olefins, epoxides, organoacids, esters, vinyl, hydride and strained olefins for grafting, polymerization, or catalysis reactions.

Claim 5 (Amended)

5.(Twice Amended) A method for selectively opening the rings in POSS compounds to form functionalized POSS derivatives comprising, reacting $[(RSiO_{1.5})_n]_{\Sigma\#}$, $[(RSiO_{1.5})_n(R^3SiO_{1.5})_m]_{\Sigma\#}$ or $[(RSiO_{1.5})_n(R^1R^2SiO_{1.0})_m]_{\Sigma\#}$ with a strong acid to form said derivatives, having a conjugate base X, which base is F, OH, SH, NHR, NR$_2$, ClO$_4$, SO$_3$CH$_3$ SO$_3$CF$_3$, SO$_3$OH, SO$_3$Cl, SO$_3$CH$_3$, NO$_3$, PO$_4$ or Cl, where n is 6-12, m is 1-10, where R^1, R^2 and R^3 are different substituents than R which are all selected from the group consisting of[ ] aliphatic, aromatic, olefinic, alkoxy , siloxy and H and where # is the sum of the lettered substituents in said POSS compound.

Claims 6-9 (Original)

6. The method of claim 3 wherein $[(RSiO_{1.5})_6]_{\Sigma 6}$ is reacted with said acid to form a
   compound selected from the group of $[(RSiO_{1.5})_4(RXSiO_{1.0})_2]_{\Sigma 6}$ and
   $[(RSiO_{1.5})_2(RXSiO_{1.0})_4]_{\Sigma 6}$.

7. The method of claim 3 wherein $[(RSiO_{1.5})_8]_{\Sigma 8}$ is reacted with said acid to form
   $[(RSiO_{1.5})_6(RXSiO_{1.0})_2]_{\Sigma 8}$.

8. The method of claim 3 wherein $[(RSiO_{1.5})_{10}]_{\Sigma 10}$ is reacted with said acid to form
   $[(RSiO_{1.5})_8(RXSiO_{1.0})_2]_{\Sigma 10}$.

9. The method of claim 3 wherein $[(RSiO_{1.5})_{12}]_{\Sigma 12}$ is reacted with said acid to form
 $[(RSiO_{1.5})_{10}(RXSiO_{1.0})_2]_{\Sigma 12}$.

Claims 10-12 (Amended)

10. (Amended) The method of claim [3] 5 wherein $[(RSiO_{1.5})_n(R^3SiO_{1.5})_m]_{\Sigma\#}$ is reacted with said acid to form $[(RSiO_{1.5})_6(R^3XSiO_{1.0})_1(RXSiO_{1.0})_1]_{\Sigma 8}$, where R^3 is of the same group as R but is a different substituent and # is m + n.

11. (Amended) The method of claim [3] 5 wherein $[(RSiO_{1.5})_7(R^3SiO_{1.5})_1]_{\Sigma 8}$ is reacted with said acid to form $[(RSiO_{1.5})_4(RXSiO_{1.0})_3$ and R^3 is of the same group as R but is a different substituent.
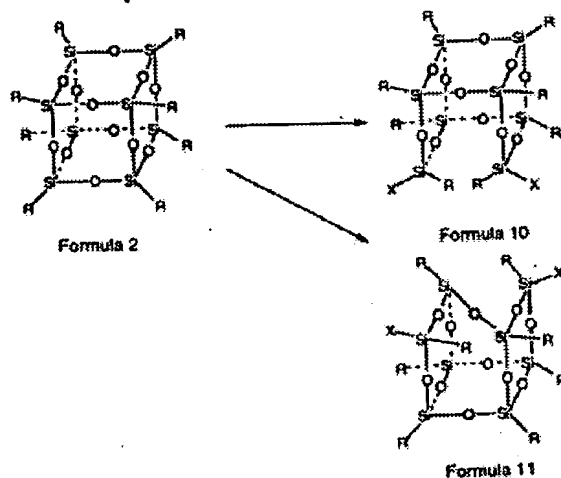
12. (Twice Amended) The method of claim 3 wherein the compound of formula 1 is reacted with said acid to form [a compound of the following formulas] a compound selected from the formulas 7a, 8a, 7c, 9a or 7d as follows:
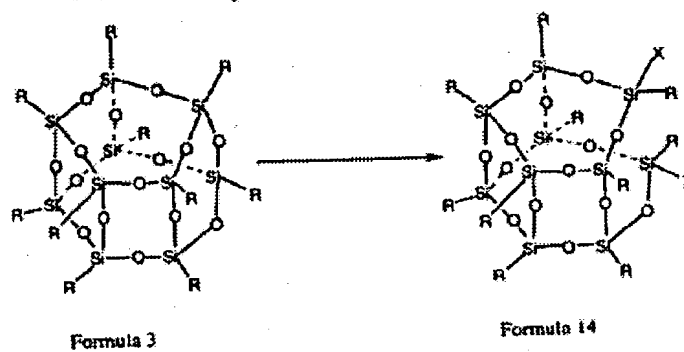

Formula 1

Formula 7a

Formula 8a

Formula 7c

Formula 9a
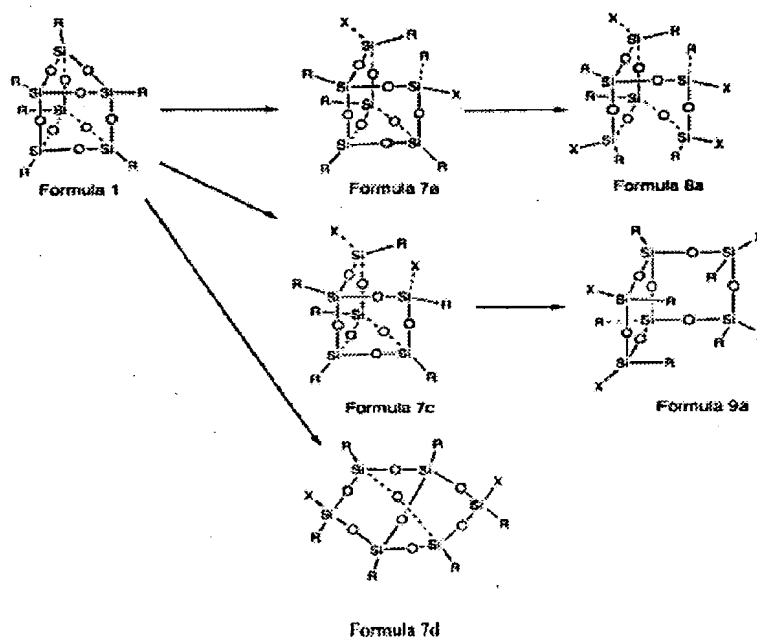
Formula 7d

Claims 13-15 (Original)

13. The method of claim 3 wherein the compound of formula 2 is reacted with said acid to form a compound of formula 10 or 11 as follows:

Formula 2
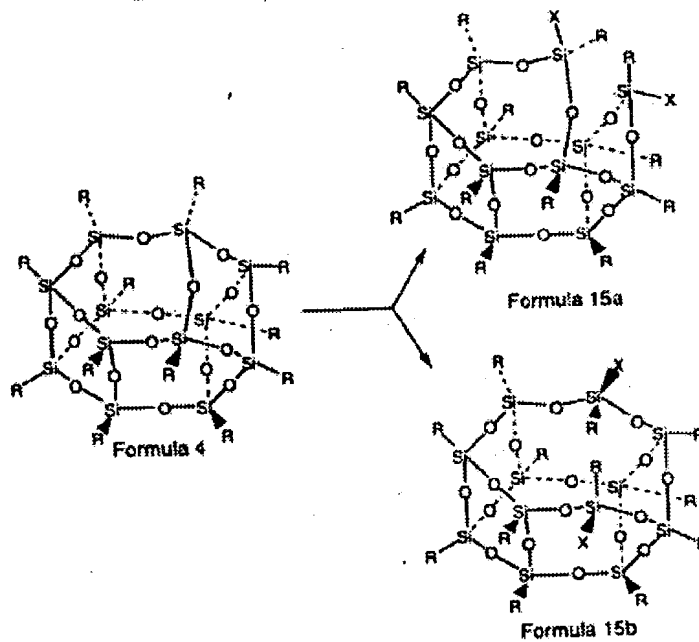
Formula 10

Formula 11

14. The method of claim 3 wherein the compound of formula 3 is reacted with said acid to form the compound of formula 14 as follows:
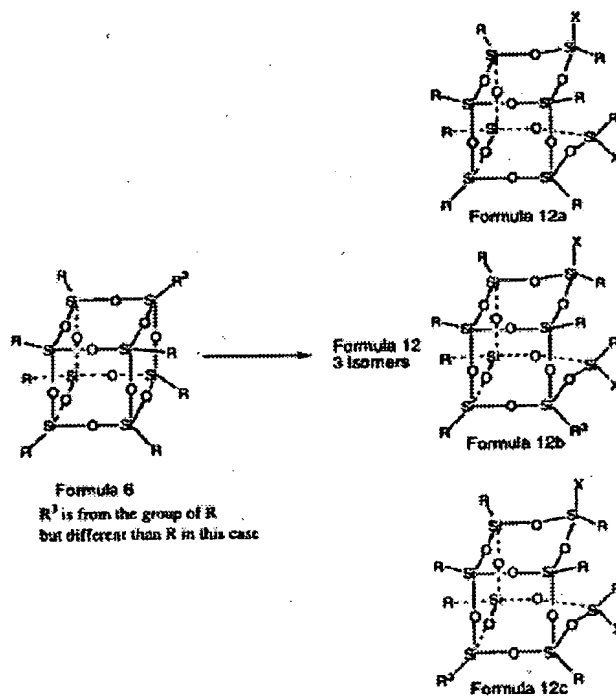

Formula 3

Formula 14

15. The method of claim 3 wherein the compound of formula 4 is reacted with said acid to form a compound selected from the group of formulas 15a and 15b as follows:

Formula 15a

Formula 4

Formula 15b

Claim 16 –18 (Amended)

16 (Amended) The method of claim [3] 5 wherein the compound of formula 6 is reacted

with said acid to form the compound selected from formulas 12a, b, or c as follows:

Formula 6
R³ is from the group of R
but different than R in this case

Formula 12
3 isomers

Formula 12a

Formula 12b

Formula 12c

17. (Amended) The method of claim [3] 5 wherein the compound of formula 6 is reacted with

said acid to form the compound selected from the group of formulas 13 a and b as follows:

Formula 6
R³ is from the group of R
but different than R in this case

Formula 13a

Formula 13b
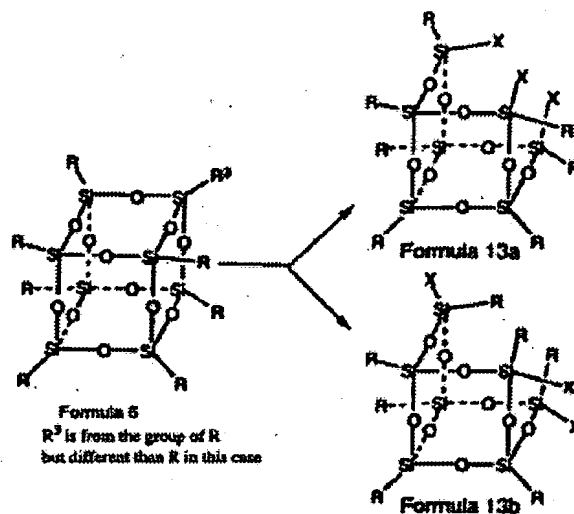
18. Thrice Amended) A polyhedral oligomeric silsesquioxane (POSS) compound of the

formula, $[(RSiO_{1.5})_n(RXSiO_{1.0})_m]_{\Sigma\#}$, where n is 4-24, m is 1-10, R is aliphatic, aromatic,

olefinic, alkoxy, siloxy or H and X is the conjugate base of an acid, which base is of F,

OH, [when] where the OH groups are in an exo-stereochemical position, SH, NHR or

NR_2, ClO_4, SO_2OH, SO_3CF_3, SO_3Cl, SO_3CH_3, NO_3, or PO_4.

Cancel claim 19.

Claim 20 (Amended)

19 20. (Twice Amended) A method for expanding rings in polyhedral oligomeric silsesquioxane (POSS) compounds comprising, reacting $[(RSiO_{1.5})_n (R(HO)SiO_{1.0})_m]_{\Sigma \#}$ with $Y_2SiR^1R^2$ silane reagents to obtain at least one expanded POSS ring in $[(RSiO_{1.5})_{n+m} (R^1R^2SiO_{1.0})_j]_{\Sigma \#}$, where R, R^1 and R^2 are aliphatic, aromatic, olefinic, alkoxy, siloxy or H, Y is halide or amine, n is 4 – 24,

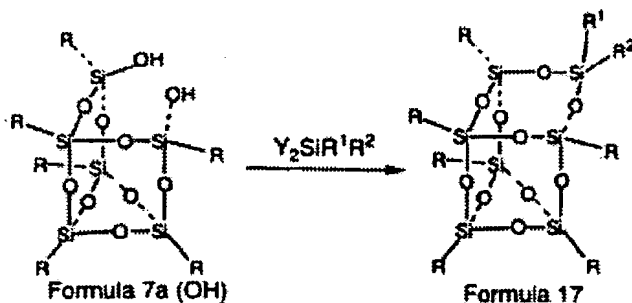m is [1-2] 1-10 and j is 1-10 and # is the sum of the lettered substituents in said respective POSS compounds.
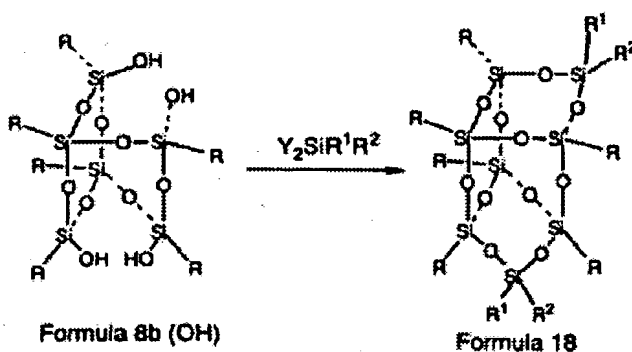
Claim 21-25 (Original)

20
19
21. The method of claim 20 wherein said R, R^1 and R^2 are alkyl, vinyl, allyl or phenyl and Y is a halide selected from the group of Cl, Br, I and F or an amine selected from the group of NH_2 and NR_2.
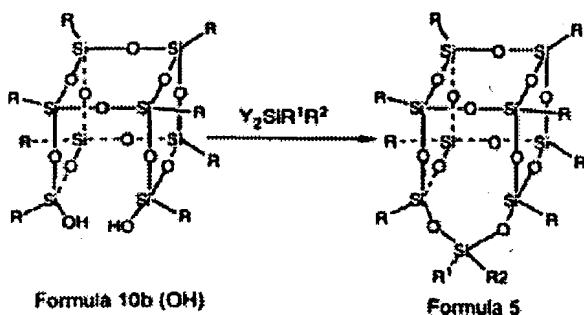
21
22. The method of claim 20 wherein

Formula 7a (OH)   Formula 17

Y₂SiR¹R²

22
23. The method of claim 20 wherein

Formula 8b (OH)   Formula 18

Y₂SiR¹R²

23
24 The method of claim 20 wherein


Formula 10b (OH)   Formula 5

Y₂SiR¹R²

24
25 A composition having at least one expanded ring in polyhedral oligomeric silsesquioxane (POSS) of the formula $[(RSiO_{1.5})_n(R^1R^2SiO_{1.0})_j]_{\Sigma\#}$, where R, R¹ and R² are aliphatic, aromatic, olefinic, alkoxy, siloxy or H, n is 4 –24, j is 1-10 and # is n+j.
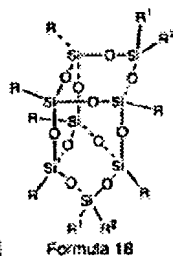
Claim 26 (Amended)

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26. (Twice Amended) The composition of claim 25 selected from the group consisting

of[one of]:

Formula 5   Formula 17   and   Formula 18
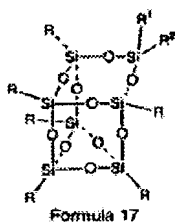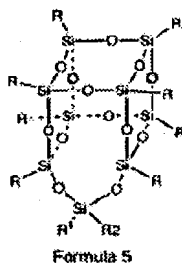
27. (Amended) The composition of formula 17 [shown in claim 22] as produced by the method

of claim 22.

28. (Amended) The composition of formula [17 shown in claim 23] 18 as produced by the

method of claim 23.

29. (Amended) The composition of formula [25 shown in claim 24] 5 as produced by the method

of claim 24.